



Nation-wide assessment of pesticide leaching to groundwater in Germany: comparison of indicator and metamodel approaches.

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In order to estimate the risk of groundwater contamination by surface applied pesticides, the fate of pesticides in the unsaturated zone needs to be evaluated. Process models that describe relevant processes such as transport of dissolved pesticides, sorption, degradation and root uptake, in combination with water and heat fluxes in the soil have been developed and used for regulatory purposes. Regional assessments are required to identify regions with higher risks of groundwater contamination. A major problem for the application of process models for a regional, EU-member state, or EU-scale assessment of pesticide leaching risk is the availability of regional databases of input parameters and boundary conditions that are required to run these models. Therefore, procedures that can assess pesticide leaching risk based on databases with regional coverage are required. In this presentation, we compare two different approaches for a regional estimation of pesticide leaching risk to groundwater in Germany. The first method uses an indicator approach to evaluate the risk of pesticide leaching as a function of a number of categorized soil, climate and pesticide properties. The result is a map of categorized risks. In the second approach, a metamodel is used to estimate the leached pesticide concentrations based on nation-wide available data of yearly average precipitation, temperature, soil organic matter content, soil texture, and pesticide parameters. The metamodel represents a synthesis of relations between climate, soil, and pesticide properties on one hand and leaching concentrations that are simulated by a more detailed process model on the other hand. The obtained maps of leaching risks and leaching concentrations were compared with the locations of anonymized pesticide findings in groundwater. The use of databases of pesticide findings in groundwater for the validation of leaching risks assessments is discussed.